OPERATING MANUAL

OPERATING MANUAL
MF/490-663

FOR

THE BURDICK MF/490 SHORT WAVE
DIATHERMY

Burdick®

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INSTALLATION AND OPERATING INSTRUCTIONS

FOR

THE BURDICK MF/490 SHORT WAVE DIATHERMY

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June 1963

THE BURDICK MF/490 SHORT WAVE DIATHERMY

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PART I

UNPACKING AND INSPECTION

The MF/490 Diathermy with accessories as selected is packed for shipment in the following manner:

> One carton containing the diathermy unit with line cord in accessory compartment;
> One or more cartons containing accessories. Check items received against packing list enclosed with accessories to determine if all items listed are included in shipment.

The tubes are shipped in the unit, installed and ready for operation.

All equipment, tubes, and accessory material is subjected to thorough tests and inspection prior to shipment from the factory. The bill of lading is a receipt showing that the shipment was accepted by the transportation company in good order. It is important that the following instructions be carefully adhered to as otherwise you may forfeit your rights to recover for damages in shipment.

Every shipment should be carefully inspected on delivery and if there is evidence of damage or shortage, proper notation should be made on the bill of lading and a bad order report should be obtained from the transportation agent.

Unpack as soon as possible after delivery. Place carton in upright position and cut all metal straps except the one near the top of the carton. Remove top and main body of carton. Lift unit from wooden base and place on floor. Examine and test the unit carefully to determine if there is any "concealed damage." If there is any evidence of damage, contact the agent of the transportation company immediately and make arrangements for inspection and issuance of a concealed damage report. Do not destroy cartons or other packing material until it has been determined by inspection of both exterior and interior of the unit and by actual operation that the unit and accessory equipment has not been damaged in shipment.

Any shortage of parts from undamaged cartons should be reported either to the dealer from whom the unit was obtained or to the Burdick Corporation.

PART II

INSTALLATION INSTRUCTIONS

Introduction

Installation consists of the following procedures:

1. Assembly of unit (Page 2);
2. Adjustment for line voltage (Page 6);
3. Connection to line and ground (Page 7);
4. Operation check and TRIMMER adjustment (Page 7).

Instructions for these procedures are outlined in this section and other material describing controls and component parts of the unit is included. Be sure to read and understand all instructions and descriptive material before proceeding with installation.

Assembly of Unit

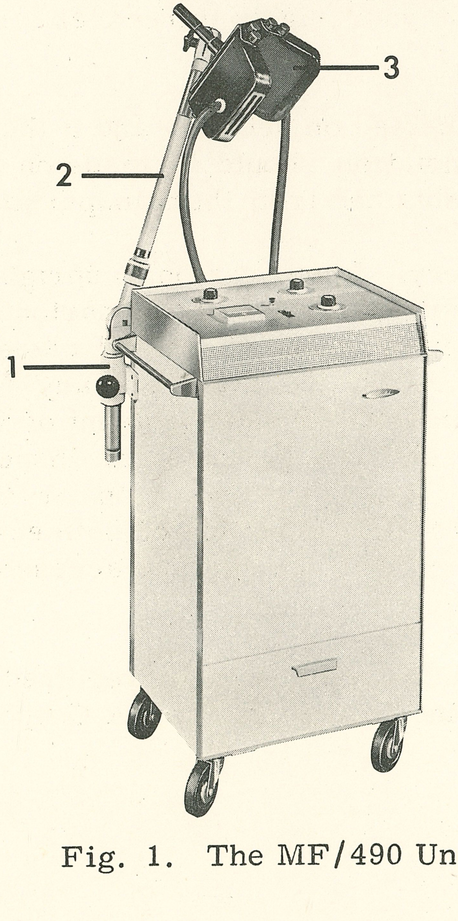
As the tubes are installed in the unit at the factory and are ready for operation, the assembly consists of installation of accessory equipment. Details of assembly of various combinations of equipment are given below.

Unit with Inductance Cable and/or Cuffs and without Arms.

No assembly required.

Unit with Contour Applicator. (Fig. 1.)

1. Remove two screws at one of the upper rear corners of cabinet, and install arm holder, Fig. 1, (1), using special screws and wrench provided. Tighten screws securely.



1. Arm Holder
2. Adjustable Arm
3. Contour Applicator

Fig. 1. The MF/490 Unit with Contour Applicator

2. Install adjustable arm, Fig. 1, (2), in arm holder, and insert and tighten knob in arm holder.
3. Install contour applicator, Fig. 1, (3), as follows:
    (a) Remove knurled aluminum retaining screw from handle of applicator;
    (b) Rotate shaft of arm so that knob is up;
    (c) Loosen knob and slide handle of applicator into hole in shaft, introducing the handle from side of arm closer to outlet jacks;
    (d) Replace retaining screw;
    (e) Tighten knob to give sufficient tension to retain applicator in position when tilted.

4. Attach rubber holder for contour applicator plugs to shaft of adjustable arm, locating it adjacent to plated collar on shaft.

5. Attach cable support to shaft of adjustable arm so that center of clamp is approximately eleven inches from end of arm.

Unit with Air Spaced Electrodes.

1. Remove two screws at each of the upper rear corners of the cabinet and install arm holders, using special screws and wrench provided. Tighten screws securely.

2. Install adjustable arms in arm holders and insert and tighten knobs in arm holders.

3. Slide an electrode guard onto long shaft of each electrode handle, locking it in position on the shaft by means of knob in hub of guard.

4. Screw an electrode into end of each handle.

5. Rotate shafts of arms so that knobs are up.

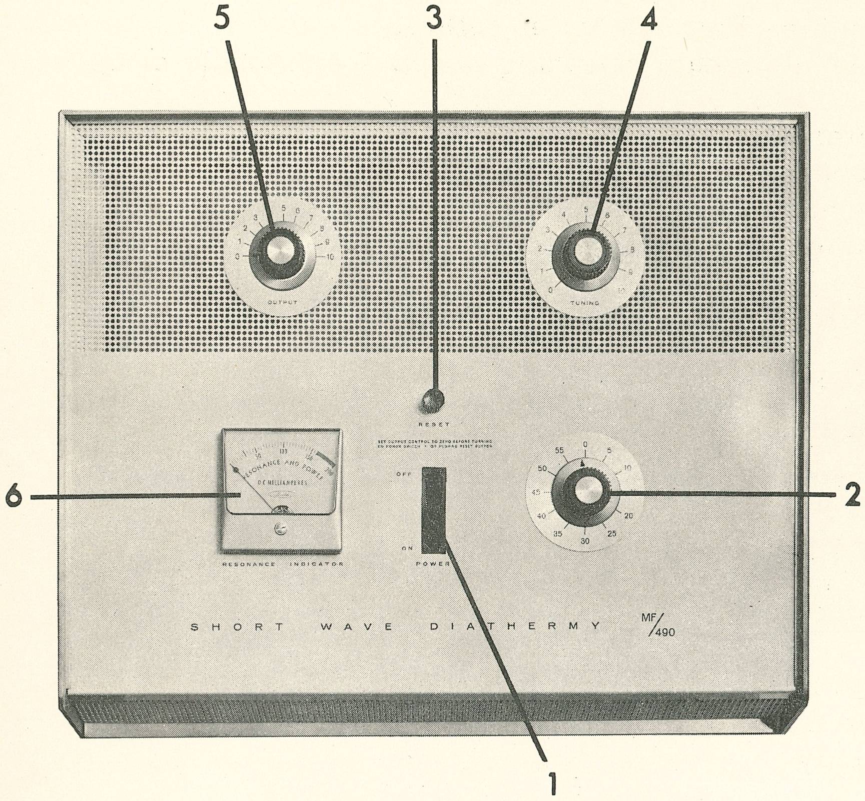
6. Loosen knob in arm on left side as rear of cabinet is faced and slide short shaft of electrode handle into hole in shaft, introducing the handle from right side of arm.

7. Loosen knob in arm on right side as rear of cabinet is faced and slide short shaft of electrode handle into hole in shaft, introducing the handle from left side of arm.

8. Attach holders for electrode plugs to shafts of adjustable arms, locating them adjacent to plated collars on shafts.

9. Attach cable support to shaft of each adjustable arm so that center of clamp is approximately eleven inches from end of arm.

Functions of Panel Controls and Interlock Switch



1. POWER Switch
2. Timer
3. RESET Button for Overload Relay
4. TUNING Control
5. OUTPUT Control
6. RESONANCE INDICATOR (Resonance and Power Meter)

Fig. 2. The Control Panel of the MF/490 Unit

POWER Switch. Fig. 2, (1). This switch makes and breaks line connections to the unit but the Timer must also be turned on before the tubes in the unit are energized. It is a circuit breaker type of switch having the overload control connected in the main line. If abnormal overload conditions other than those affecting the overload relay occur within the unit, this switch will automatically "trip" and thus break the connection to the line. Line connection is restored simply by turning the OUTPUT control to 0 and pushing POWER switch handle to ON. Always observe the instruction on control panel - "SET OUTPUT CONTROL TO ZERO BEFORE TURNING ON POWER SWITCH OR PUSHING RESET BUTTON." This applies under all conditions - when first starting unit as well as at any time after the circuit breaker trips. A cord is supplied so that patient can pull switch handle to OFF if necessary in absence of technician.

Timer. Fig. 2, (2). This is a clock operated timer switch that automatically shuts off power after a desired amount of time has elapsed. It can be set for any time up to one hour by first turning the knob to 5 or above and then to the desired point.

RESET Button for Overload Relay. Fig. 2, (3). If the operator turns OUTPUT control too high - as indicated by the pointer of the meter being in the red area at the upper end of the scale - an overload relay mounted on the back of the control panel will automatically break the line connection. When this occurs, the RESET button will pop up and the meter will read zero. To restore unit to operating condition, first turn OUTPUT control to 0 and then depress RESET button. Contact is not established until the button is released, a safety feature that prevents operator from holding overload current on by means of the RESET button. Pressing the RESET button under any condition first opens the switch contacts and holds them open until pressure on RESET button is removed.

TUNING Control. Fig. 2, (4). This tunes the output (patient) circuit so that it resonates with the final amplifier, an operation necessary to transfer energy to the patient. This control must always be adjusted to give maximum indication on the meter. This is the indication of resonance. The position on the TUNING control dial at which resonance occurs depends on the particular electrode application to patient. This control does not act the same as the OUTPUT control, because turning TUNING control in same direction after maximum milliamperes (resonance) is indicated causes a decrease in milliamperes.

It is necessary to adjust TUNING control for maximum milliamperes (resonance) to enable the meter to function as a power output indicator.

Resonance point position on TUNING control dial varies for the different types of applicators. The contour applicator, flexible inductance applicator and inductance cable tune in the upper range of the dial while air spaced electrodes and condenser electrodes (cuffs) tune in the lower range.

OUTPUT Control. Fig. 2, (5). This provides a continuously variable control of the energy reaching the patient. If this control is turned so high that the meter indicates in the red area at upper end of scale, the overload relay will trip. Power is restored by first turning OUTPUT control to 0 and then depressing and releasing RESET button.

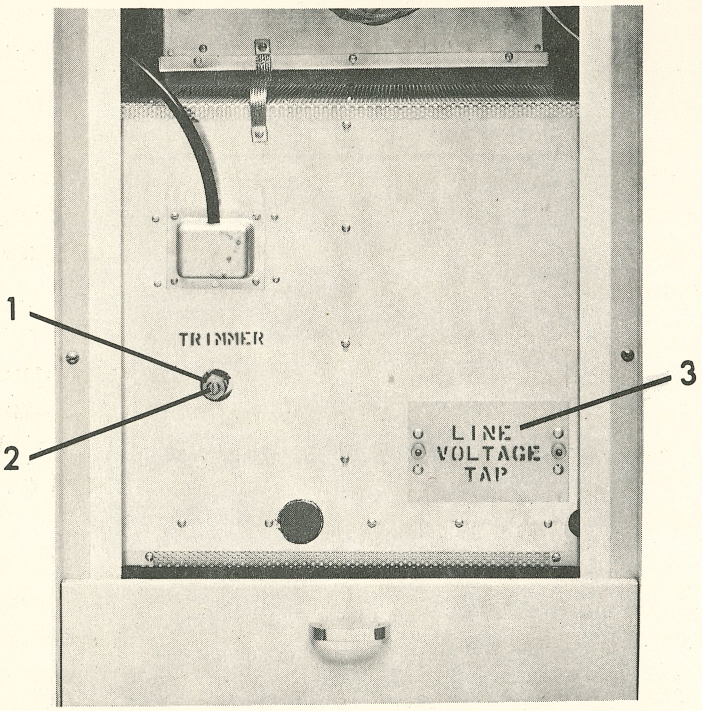
RESONANCE INDICATOR. Fig. 2, (6). This meter is an indicator for resonance, and when TUNING control is adjusted for maximum reading on meter (resonance) during treatment, it serves as an arbitrary guide to the amount of energy being generated. It also is an indicator used in checking operation and making TRIMMER adjustment.

Interlock Switch. Although this switch is not located on the panel, its function is closely allied with the other controls. The switch is located in the lower right rear corner of the unit and is actuated by a projection on the rear panel. Whenever the rear panel of the cabinet is loose or removed from the cabinet the switch is automatically in the off position and there is no possibility that anyone can get a high voltage shock if the panel over tube compartments is removed. If at any time the meter does not indicate although both switches are turned on, the overload relay RESET button has been depressed, and line connections are known to be all right, this switch should be checked to be sure that it is in the on position.

Adjustment for Line Voltage

Correct operation and satisfactory tube life depend on a proper supply line and careful adjustment of the unit for the prevailing voltage. To make this adjustment possible, taps are provided on the primary winding of the transformer. The following procedure should be carefully observed:

1. Check the current supply to make sure that it is of the voltage and frequency (cycles) on which the unit, according to its rating plate, was built to operate.
2. Check the line voltage at the outlet to be used. Measurement should be made with an accurate AC voltmeter such as a Weston Model 433, range 300/150 volts, with readings taken over a period of several minutes in order that any variation may be noted.
3. Remove front panel of cabinet by removing the two screws at bottom of panel. These are concealed by the accessory compartment door.
4. Be sure line cord is detached from cabinet.
5. Remove small panel marked "LINE VOLTAGE TAPS." (See Fig. 3.



1. Shaft Locking Nut
2. TRIMMER Shaft
3. Line Voltage Taps (Remove panel)

Fig. 3. Section of the MF/490 Unit with Front Panel Removed

6. Connect white wire to terminal corresponding to the voltage range indicated by the voltage measurement obtained in step 2. The following tables show the voltage range for each of the four taps in the 115 and 230 volt units.

115 Volt Units	230 Volt Units
Line Voltage Range	Line Voltage Range
98 - 104	196 - 209
105 - 111	210 - 223
112 - 120	224 - 241
121 - 130	242 - 260

7. Replace panel over line voltage taps but leave front panel off for subsequent adjustment of the TRIMMER.

Connection to Line and Ground

1. Attach line cord to unit by inserting three wire plug into receptacle on lower right side of cabinet. Push plug in as far as possible and rotate in clockwise direction to lock in position.
2. See that POWER switch is at OFF and Timer is at 0.
3. Attach line cord to a wall receptacle of a voltage and frequency corresponding to that given on the rating plate of the unit. This connection is made by means of a 3-wire male plug of the type which is required by current Underwriters' Laboratory regulations for equipment which should be grounded.
4. Connection of the 3-wire plug to a properly grounded 3-wire grounding type receptacle automatically grounds the unit.

Operation Check and TRIMMER Adjustment

IMPORTANT. Before making tests described below, be sure instructions Functions of Panel Controls and Interlock Switch on Pages 4 and 5 are understood.

The TRIMMER, Fig. 3, provides circuit adjustment to compensate for changes in factory adjustments that may occur during shipment.

1. The MF/490 unit should be in the following condition:

   Line voltage measured and primary connections adjusted according to instructions on Page 6;

   POWER and Timer switches both in OFF position;

   OUTPUT and TUNING controls both at 0;

   Nothing plugged into outlet jacks;

   Line cord attached to unit and wall outlet;

   Front panel off;

   Unit must be at room temperature - if unit has been moved in from the out-of-doors in winter time, it should be allowed to stand long enough to warm up to room temperature.

2. Check zero reading on meter and set pointer to zero, if necessary, by adjusting screw on meter.

3. Loosen hexagonal locking nut on the shaft directly under the word "TRIMMER." (See Fig. 3, Page 6.) Be careful to prevent movement of shaft which would change factory adjustment.

4. Turn on Timer and POWER switches.
   (a) If meter does not indicate, press RESET button. If it still does not indicate check rear panel interlock switch (see page 5).
   (b) If meter reads above 50, make initial adjustment by turning the TRIMMER shaft very slightly in the direction that will reduce reading to a minimum, then proceed with step 5. (See notes 1 and 2).
   (c) If meter reads below 50 proceed with step 5.

5. TRIMMER Adjustment.
   (a) Allow unit to operate for at least 5 minutes. (The actual meter reading at any time less than 5 minutes, except in the extreme case in step 4 (b), is not important. It is very important that unit reaches normal operating temperature before adjusting TRIMMER.
   (b) Turn TRIMMER shaft very slightly in the direction that will reduce meter reading and set shaft to obtain minimum reading. (See notes 1 and 2).
   (c) While watching meter pointer, turn OUTPUT control to 10 (be sure TUNING control is on zero). This probably will change the meter reading. Turn OUTPUT control back and forth between 0 and 10 and adjust TRIMMER shaft to a position that results in the minimum change in meter reading caused by the changing position of OUTPUT control.

   While a change of 1 scale division on meter is acceptable, it is desirable to make precise TRIMMER adjustment to reduce this change to the very minimum. The normal actual minimum reading varies slightly among individual units and also with line voltage. It is, however, in the neighborhood of the marker at 30 on the dial.
   (d) When final adjustment is completed, tighten hexagonal locking nut, watching meter pointer to be sure that locking operation does not disturb the adjustment. Rock OUTPUT control between 0 and 10 as final check, and readjust TRIMMER if necessary.

Note 1. A very small amount of rotation of the shaft causes a large change in position of the meter pointer. If care is not taken it is easily possible to cause the meter pointer to go into the overload area and the overload relay will trip.

If this misadjusted condition exists before trimming procedure is started, as will be evident by the overload relay tripping the instant POWER and Timer switches are turned on, or if it occurs during TRIMMER adjustment, the following procedure should be followed.

With OUTPUT and TUNING controls both on zero, turn shaft in one direction in small increments, each time turning POWER switch off and pushing down RESET button if overload relay trips. If several trials in this shaft direction fail to reach a condition permitting overload relay to hold in, repeat the procedure turning shaft in opposite direction. Finally a shaft position will be found at which the overload relay will not trip. Continue turning shaft in this direction to reduce meter reading to a minimum.

Note 2. Use a screw driver that fits tightly in the shaft slot to avoid play so that it will be possible to make precise adjustment.

PART III

OPERATING INSTRUCTIONS

BE SURE THAT ADJUSTMENT FOR LINE VOLTAGE (PAGE 6) AND OPERATION CHECK AND TRIMMER ADJUSTMENT (PAGE 7) HAVE BEEN MADE PROPERLY BEFORE OPERATING THE UNIT.

Operation of Panel Controls

POWER and Timer switches must be on simultaneously to energize unit. A reading on the meter indicates that power is on. It makes no difference which switch is turned on first when starting or turned off first when stopping. The usual practice when starting is to turn on the Timer, then the POWER switch, "tune in" the patient with TUNING control, (see Paragraph 5, below), set OUTPUT to desired point, and then set Timer for desired treatment time. The POWER switch is more conveniently used to turn off power before Timer has run off the pre-set time.

To prolong tube life, the best practice is to set OUTPUT control at 0 before turning on POWER and Timer switches and to leave it at 0 for about 15 seconds before advancing it to a higher setting.

Operation of Unit

Start with both switches in the off position and with OUTPUT and TUNING controls at 0. Depress RESET button to be sure that relay has been restored to operating position.

1. Set Timer to any position above 5 on dial.

2. Turn on POWER switch.

3. With OUTPUT and TUNING controls at 0, allow unit to warm up for a minute or two. During that time, insert applicator plugs into jacks at rear of cabinet and apply applicator to patient. (See Part IV for technic of application.)

4. Advance OUTPUT control to about 3.

5. "Tune in" patient by slowly advancing TUNING control to the point of maximum indication on meter. Carefully rock TUNING control back and forth to find the exact peak but do not operate the control too fast for the peak may be passed over unnoticed.

   NOTE. The TUNING control "tunes in" the patient load almost exactly like a station is "tuned in" on a radio. The OUTPUT control corresponds to the volume control on a radio.

6. Adjust OUTPUT control to give desired power output.

7. Check setting of TUNING control for maximum indication. It is well to check this setting occasionally during the treatment.

   CAUTION. Never reduce power output by changing setting of TUNING control. Never increase power output by changing setting of OUTPUT control unless setting of TUNING control for maximum indication on meter has been checked first.

8. Set Timer for desired treatment time.

If the pointer of the meter registers in the red area at any time, an overload relay shuts off the high frequency power. This is indicated by the RESET button popping up and by a zero reading on the meter. The relay is re-set and power restored by turning the OUTPUT control to 0 and depressing and releasing the RESET button.

Important Operating Rules

1. To promote conditions favorable to longer tube life, always, under any circumstance, set OUTPUT control at 0 before turning on POWER switch or pushing RESET button. Also leave OUTPUT control at 0 for at least 15 seconds before advancing it to a higher setting.

2. Start the treatment with OUTPUT control set to give a moderately warm sensation. The most reliable guide to dosage is the patient's tolerance but the reading of the meter should be noted because it indicates relative power output, making it possible to duplicate treatments. After experience is gained, the meter becomes a useful guide to dosage. Remember, however, the meter will not be a true indicator of relative power output unless the TUNING control is adjusted for exact resonance indicated by maximum meter reading during treatment. (See Instruction 7, Page 10.)

3. When using contour applicator, get as much contact with the patient as possible. Operation of the contour applicator while not in contact with patient, or with very slight contact, may cause the POWER switch or overload relay to trip. The best procedure is to use the minimum amount of spacing between applicator and patient and adjust the applicator so that it contacts as large an area as possible so that the desired heating is obtained at the lowest possible setting of the OUTPUT control.

4. When applying applicator, make sure patient is in a comfortable position so as to avoid movement of patient which would necessitate a change in the "tuning in" adjustment.

5. Be sure applicator leads do not cross. Space them well away from each other (about five or six inches) and away from any conductive material.

6. When forming or placing pancake coil, have cable leading from the center of the coil to the unit away from the patient and separated from the coils of the cable with a sponge rubber insulator sleeve or several thicknesses of toweling.

7. Do not treat patient resting on objects which are grounded or use beds, couches, tables or chairs with steel springs or inner spring mattresses, because sufficient heat may be generated to ignite the mattress material.

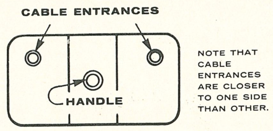
8. Do not tune and advance OUTPUT control if any of the applicators are connected but not applied to patient. Unnecessary equipment heating may result without anything useful being accomplished.

9. Replace any applicator upon evidence of deterioration.

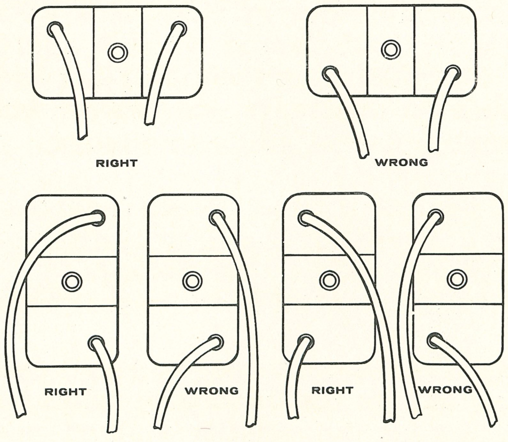
10. To be sure of getting normal output, always make a very careful final adjustment of TUNING control for the exact peak on meter after each adjustment in the OUTPUT control setting. Also check TUNING control adjustment from time to time during treatment, especially if patient notices a substantial reduction in heating.

11. The cables of the contour applicator must not cross each other and should be correctly positioned, as illustrated below, to insure proper performance of the unit. Correct placement of the cables should be maintained regardless of adjustment of the applicator to body contours or position of the patient.

REAR VIEW OF APPLICATOR


CABLE ENTRANCES
HANDLE
NOTE THAT CABLE ENTRANCES ARE CLOSER TO ONE SIDE THAN OTHER.

PLACEMENT OF CABLES



Adjust applicator to obtain maximum contact of applicator face with patient using only one layer of Turkish toweling between the face of the applicator and the patient.

PART IV

TECHNIC INSTRUCTIONS

(The preceding parts of this manual must be carefully read and thoroughly understood before any treatments are administered.)

Preparation for Treatment

Instruct patients to remove all metallic objects such as pins, buckles, metal fasteners, bobby pins, coins, knife, watch, and keys from the region of treatment as these items may become hot if left in the magnetic field.

Clothing should be removed from the area of treatment in order that the skin may be examined for abnormal conditions, and to prevent damage to clothing by profuse perspiration.

Patient should be reclining on treatment table, bed, or couch if possible. In some cases, it is desirable or necessary to treat a patient seated in a chair. Do not use furniture having springs or other metal parts which during treatment would be less than six inches from any part of the contour applicator or inductance cable. Metallic objects within an electromagnetic field may become heated even to the point of causing fire.

Make sure patient is in a comfortable position to insure minimum movement of patient and the resultant change in the "tuning in" adjustment.

Advise patient that only a pleasant sensation of warmth should be felt during treatment and that any burning, throbbing, cramping, or other unpleasant or painful sensations should be reported at once to the person in charge of the treatment. Burns will be caused by too intense application of short wave diathermy.

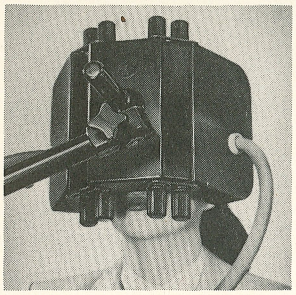
Application of Short Wave Currents

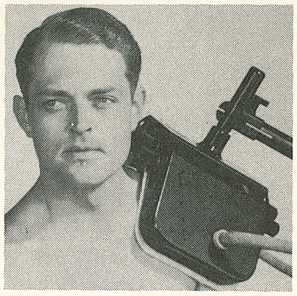
Dosage. The patient's skin tolerance to heat is the most reliable guide to dosage. While the meter is an indicator of relative output, the indication at patient's tolerance varies with the different types of applications as well as with different patients. Note the reading on the meter for each particular treatment and thus make it possible to duplicate the treatment. After experience is gained, the meter becomes a useful guide to dosage.

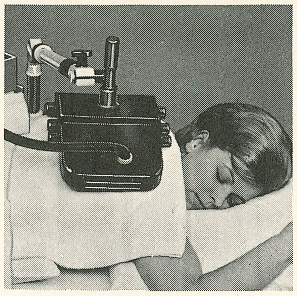
Duration of Treatment. Treatment time ranges from ten minutes upward. However, it is generally considered advisable to limit treatments to the face and head to ten minutes. In other areas a twenty-minute application may be used, and in some cases a mild treatment of even longer duration may be desirable.

Frequency of Treatment. Treatments may be given every day in the beginning and every second or third day as the case progresses. Some cases may need two or more treatments per day but usually a short wave treatment every day or every other day is sufficient.

Precautions. Caution must be used if the heat sensation of the skin in the area under treatment may be subnormal. In such cases, the skin sensation to heat







can be tested by placing test tubes filled with water of known temperature in contact with the skin surface. If sensation is subnormal, use less than normal dosage and check area frequently to determine if heating is proper.

When a bony part projects beyond the rest of the area under treatment, care should be taken to stop treatment immediately if the patient complains of pain instead of a pleasant sensation of warmth, as otherwise the joint may become overheated.

If headache or dizziness occur during application about the head, the treatment should be stopped and the patient placed in a reclining position until the symptoms subside. If treatment is then resumed, less current should be used.

When treating cases with heart disease, the pulse should be watched and if it becomes rapid or irregular, the treatment should be stopped or the amount of current reduced. This rule also applies when administering treatment in the region of the heart.

Contraindications

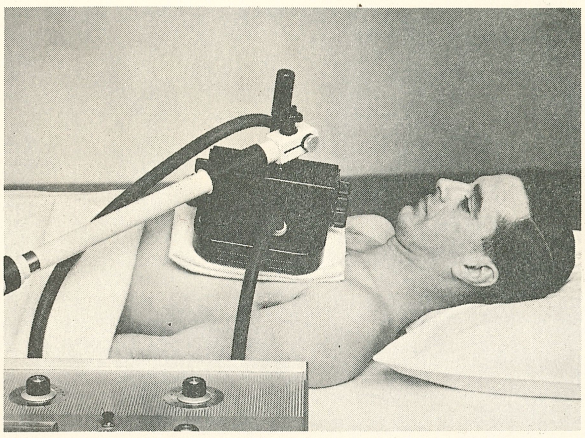
Treatment may be contraindicated in the following conditions:

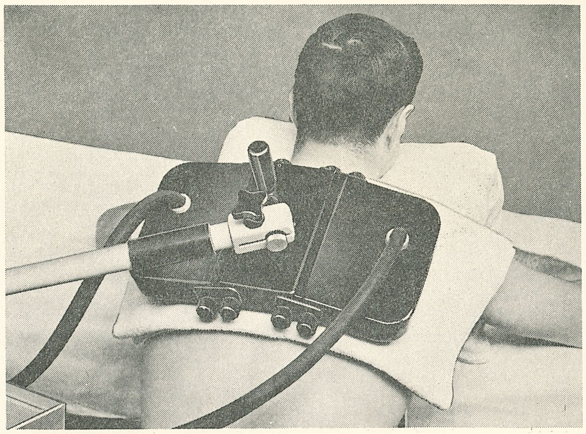
Acute inflammatory processes, such as acute, nondraining cellulitis;
Acute infectious arthritis;
Where there may be a tendency to hemorrhage, as gastric ulcer;
Ischemic tissues;
Impaired circulation (peripheral vascular diseases);
Over malignant tissues;
Edematous tissues;
Through the abdomen or lower back during pregnancy;
Over areas known to have metallic implants;
Over adhesive tape;
Over epiphyseal areas of growing bone.

Treatment of areas where heat sensation has been lost or is impaired must be given with great care.

Caution

Federal law restricts the sale of this device for use by or on the order of a physician or any other practitioner licensed by the law of the state in which he practices to use or order the use of this device.





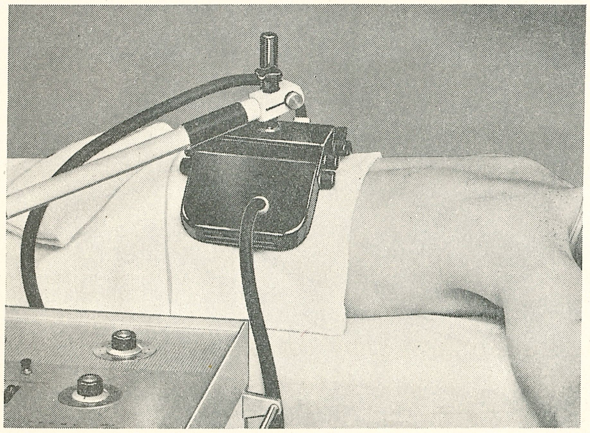
Treatment Applicators

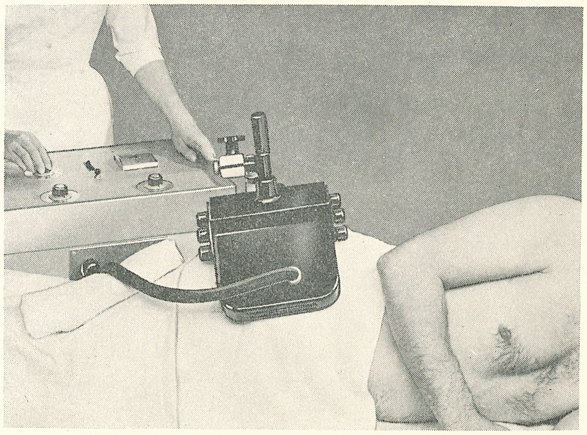
Any of the following types of applicators may be used with the MF/490 Diathermy: (1), the contour applicator; (2), flexible inductance applicator; (3), the inductance cable; (4), air spaced electrodes; and (5), condenser electrodes or cuffs. Regardless of the type of applicator, operation of the unit is identical in all cases. (See Page 10.) However, the applicators are applied in different ways as described in the following paragraphs.

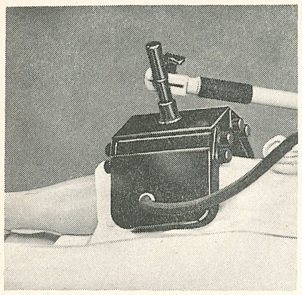
Contour Applicator. The Burdick contour applicator provides a readily adapted and efficient means for heating of tissue. The element in this applicator consists of a flexible spiral coil designed and placed to provide uniform heating over the entire area covered.

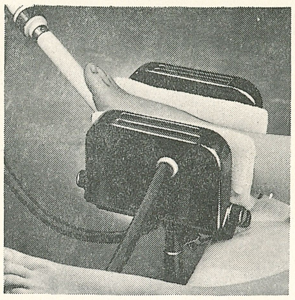
The applicator is very flexible in adjustment and can be readily formed to fit the contours of the body. It retains its adjustment by means of tension on the hinged joints. (Adjustment of the knobs controlling the tension should be made only as necessitated by considerable wear in the parts.)

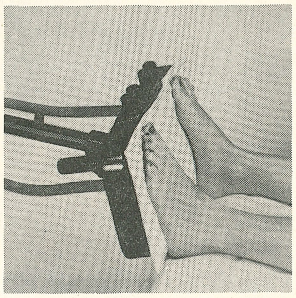
The contour applicator is designed to be used in contact with the area to be treated with an intervening layer of Turkish toweling (terry cloth) or other absorbent material of sufficient thickness to absorb perspiration and for sanitary purposes. Other types of applicators, such as condenser cuffs and inductance cable, require additional spacing from the part in order that efficient heating of the tissue may be produced. This is not required with the Burdick











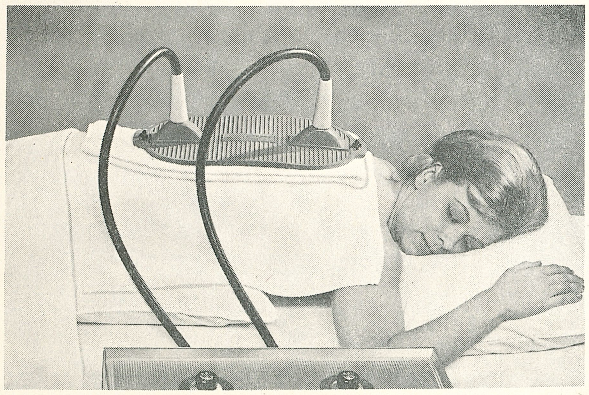
contour applicator as proper spacing is provided within the applicator itself. If it is necessary to reduce power, do not increase spacing - use the OUTPUT control. (See Instruction 7, Page 11.) When the contour applicator is adjusted into a "U" shape for the treatment of small irregular parts such as hands, elbows, or ankles, additional spacing material may be used to stabilize the part being treated, and for the comfort of the patient.

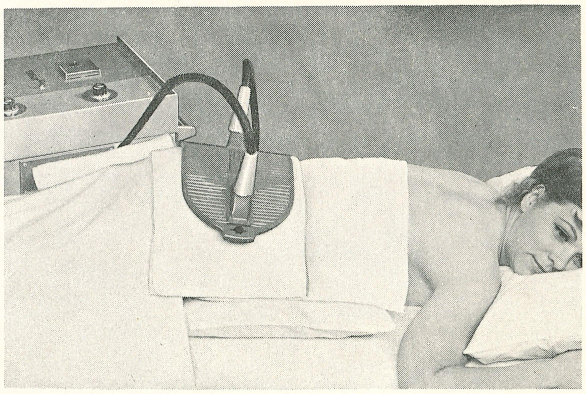
Be sure contour applicator leads do not cross. Space them well away from each other (about five or six inches) and away from any conductive material.

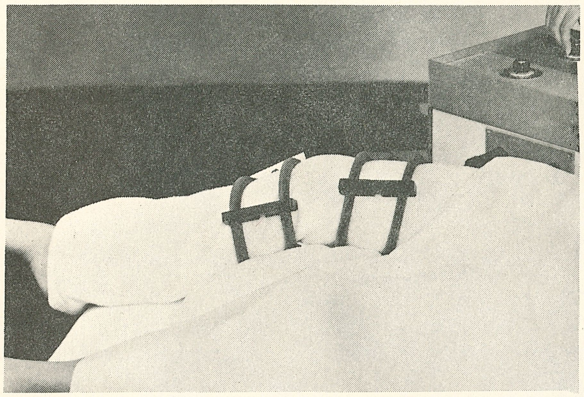
The contour applicator is adaptable and effective for treating sinuses, facial conditions, hands, wrists, forearms, elbows, upper arms, shoulders, feet, ankles, legs, knees, thighs, hips, and any part of the torso section. (See illustrations on Pages 13, 14 and 15.)

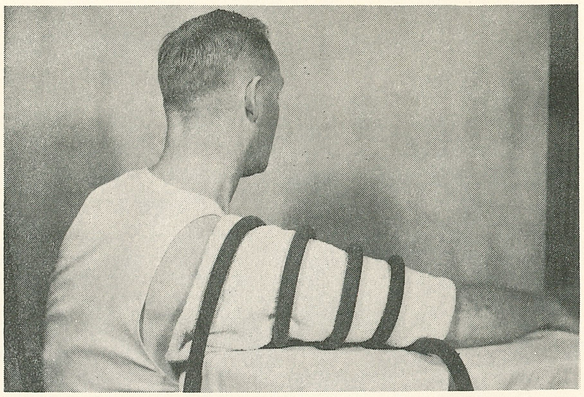
Flexible Inductance Electrodes. The Burdick flexible inductance electrode, being a spiral of thin copper encased in soft rubber, is easily and efficiently adjusted to most of the contours of the body. The metallic element covers almost the entire area of the electrode so its flexibility and large size is a desirable combination, applicable in a majority of treatments. Two layers of Turkish toweling are used between the electrode and the patient for the combined purpose of spacing, sanitation and absorption of perspiration. However, in treating small parts, such as hands, elbows and ankles, additional toweling may be used to facilitate application to the part. While many treatments can be given without need of anything to hold the applicator in position, a strap is provided for binding it in place.

Either lead of the electrode may be connected to either outlet jack of the unit but the leads must not come in contact with each other or with metallic parts of the unit or treatment table. Maintain a minimum of five inches distance between leads and two or three inches between leads and any metal. A spacing of at least an inch should be established between leads and any part of the body of the patient as otherwise a loss of current and a sensation of heat may occur at this point.





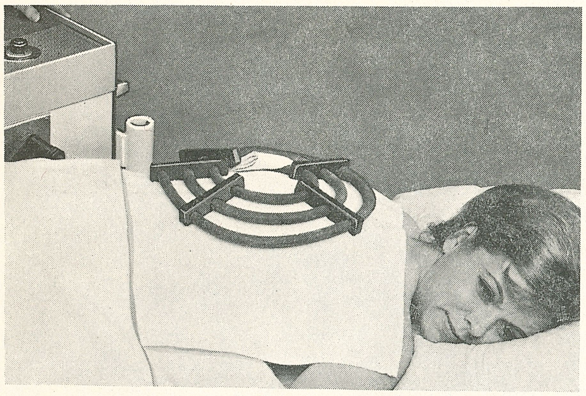


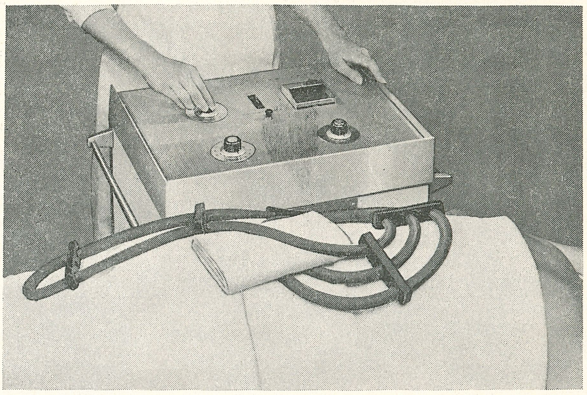


Inductance Cable. The inductance cable is particularly applicable and effective in treatments of the neck, full extremities, and large areas of the chest and back. When using the cable, approximately 1/4" to 1/2" of Turkish toweling, four to eight thicknesses of average weight towels, should be used for spacing and absorption of perspiration.

Good results from diathermy often depend upon the heating of large areas even though the condition being treated may seem to be quite definitely localized. Application of the inductance cable to extremities in the manner illustrated above provides a very effective method of producing heat in those large areas. Experimental application of diathermy in this way has shown a very substantial increase in the blood supply of the extremity. Careful application of the cable without pressure is necessary to prevent congestion of blood.

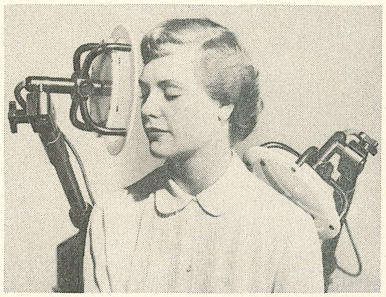
When using the cable in this wrap-around method, wrap the part of the extremity to be treated with toweling, form the cable into three or more loops a little larger than the wrapped area, and slip the loops over the extremity to the area to be treated. Adjust the cable so that all parts are in close contact with the toweling, space the turns evenly and hold them in place by means of D-70 Cable Spacers. If four or more turns are used, except in cases where small extremities are to be treated, it is necessary to allow more spacing between turns than that provided by using adjacent sections of this spacer. Space the turns at a distance that will cover the area to be treated and will also allow proper tuning of the unit.

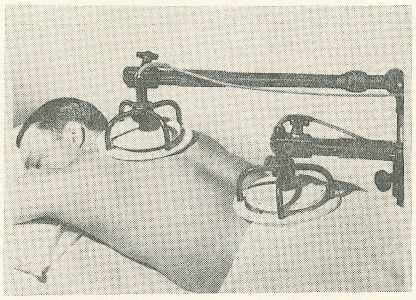


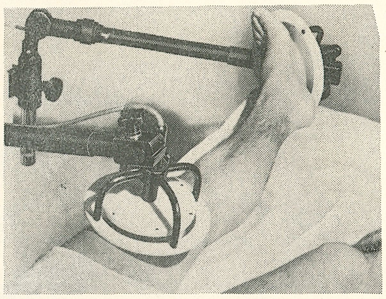


Flat or pancake coil applications are suitable for treatment of relatively flat surfaces and are especially valuable in treatment of large areas such as the entire back or chest. The pancake coil is formed by coiling three turns of the cable into a flat spiral coil of a size suitable for the area to be treated. Make sure that each turn is evenly spaced from the next by use of the cable spacers. If the inside diameter of the coil is less than six inches, the turns may be spaced by using adjacent sections of the spacer. The turns of a coil of larger inside diameter must be spaced at a greater distance and the end sections of the spacer may be used for this purpose. When forming or placing the pancake coil, have cable end leading from the center of the coil to the unit spaced away from the patient and separated from the turns of the coil by a sponge rubber insulator sleeve or a folded towel. It is well to use a blanket or sandbags to hold the coil in close apposition to the patient.

The accompanying illustrations show some applications of the pancake coil. Applying the cable in this manner allows treatment of large adjacent areas simultaneously.







Air Spaced Electrodes. The air spaced electrodes afford a means of applying heat to areas without the electrode or spacing material being in contact with the patient. As the relative positions of the electrode and electrode guard can be changed by loosening the locking knob and sliding the guard on the shaft of the electrode handle, spacing between electrode and patient can be easily established. This spacing should range up to 1". Too much spacing will be indicated by extreme fluctuation of the meter or impossibility of tuning.

The illustrations above show some of the applications possible with these electrodes but many other applications can be made. Some of the more common applications are described below.

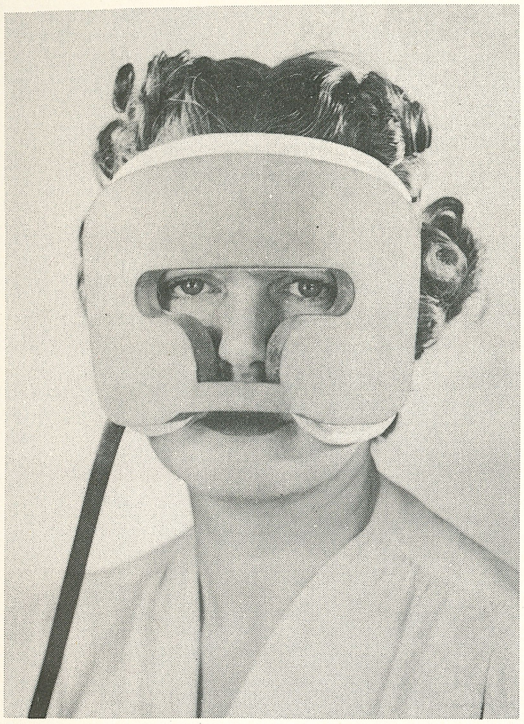
Sinuses. Adjust guards so that faces of plates are approximately 1/2" from face of guard. With one edge of guards brought closely together adjust electrodes so that plates are parallel to areas to be treated.

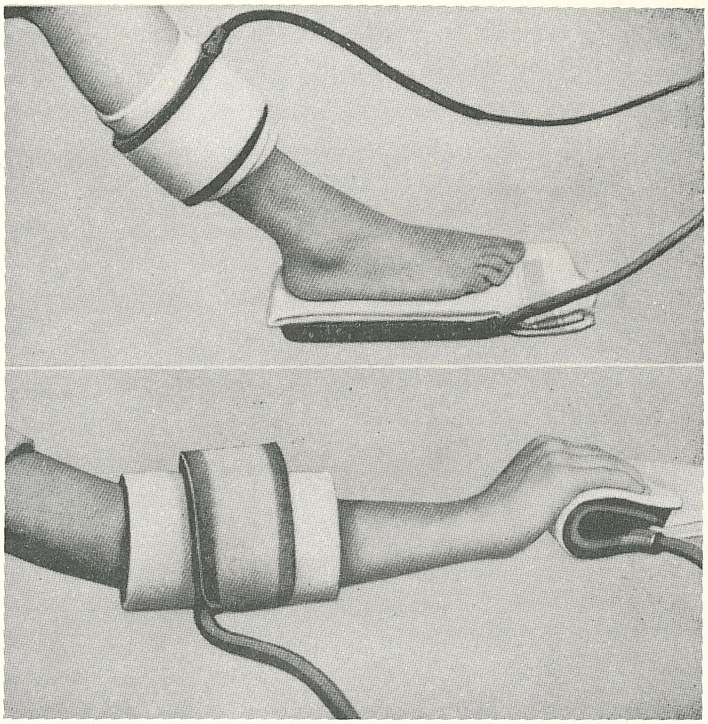
Ear. Place one electrode over ear with guard adjusted as necessary to give about 1/2" spacing between ear and electrode. Place other electrode adjacent to chest or back allowing more spacing than with electrode over the ear.

Chest. Place one electrode over right side of chest and other electrode over left side. Space electrodes equidistant from chest.

If in any case it is desired to concentrate heat closer to one electrode than the other, allow less space between that electrode and the patient.

Be sure cable leads do not cross. Space them well away from each other (about five or six inches) and away from any conductive material.





Condenser Electrodes. The condenser electrodes are applied similarly to the air spaced electrodes except that it is necessary to place 1/4" to 1/2" of Turkish toweling between the electrodes and the patient for spacing and absorption of perspiration. In treating joints, one electrode should be applied above the joint and the other below. Application of the electrodes for treatment of the chest and back should be in adjacent areas of the same surface in order that heating will be most efficient.

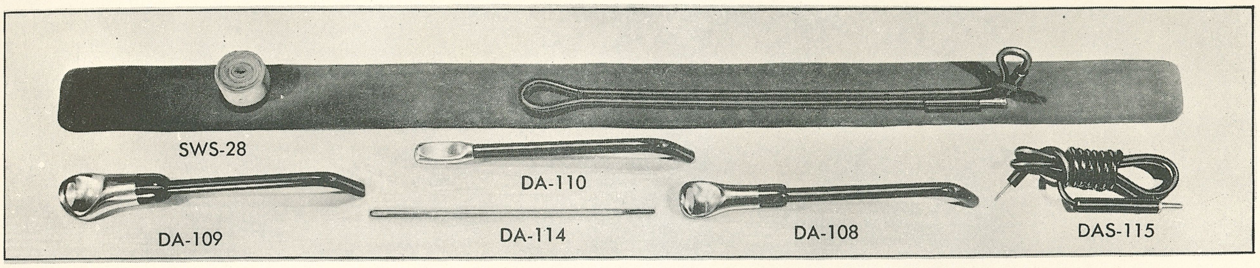
Be sure cable leads do not cross. Space them well away from each other (about five or six inches) and away from any conductive material.

Orificial Applications

The MF/490 Diathermy is very efficient for orificial application of heat with vaginal and prostatic electrodes. A special cord, DAS-115, is required for attachment of the active electrode to the unit. The electrodes are designed to allow insertion of a thermometer for measurement of orificial temperature.

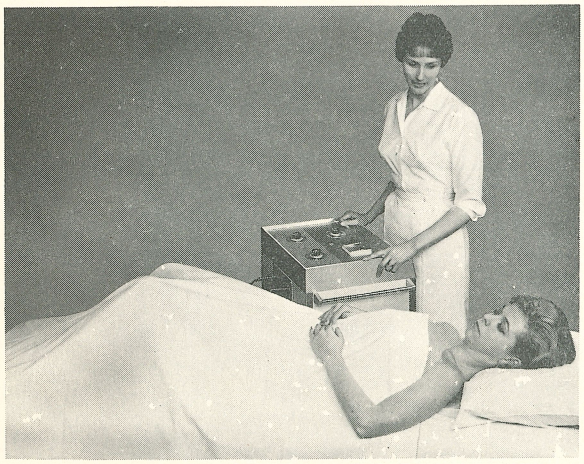
One of the regular condenser electrodes or an air spaced electrode may be placed on the abdomen and connected to the diathermy as an indifferent electrode. However, an improved type of condenser electrode has been developed for this purpose and its use is recommended. This electrode, the SWS-28 Indifferent Belt Electrode, is designed to encircle the body of the patient at the pelvic level. It is held in place by the retaining strap provided and is connected to the unit by means of the cord supplied with the electrode.

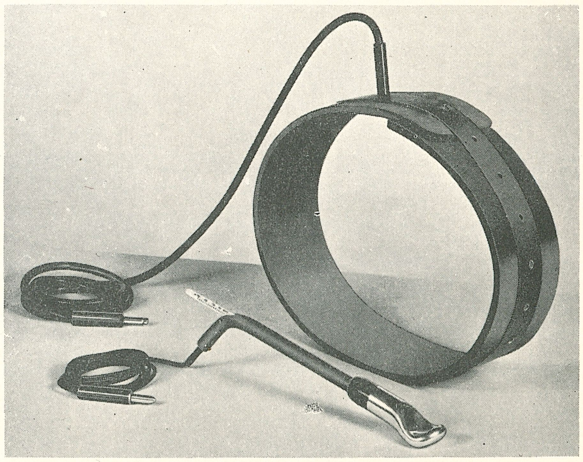
The electrodes and accessories for this application of diathermy are illustrated and described below.

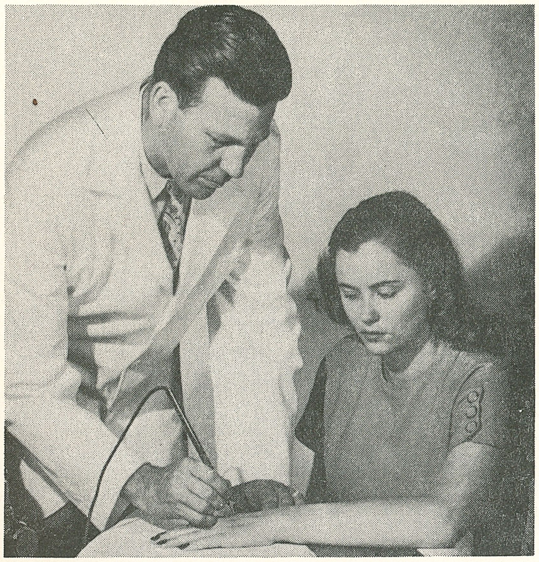


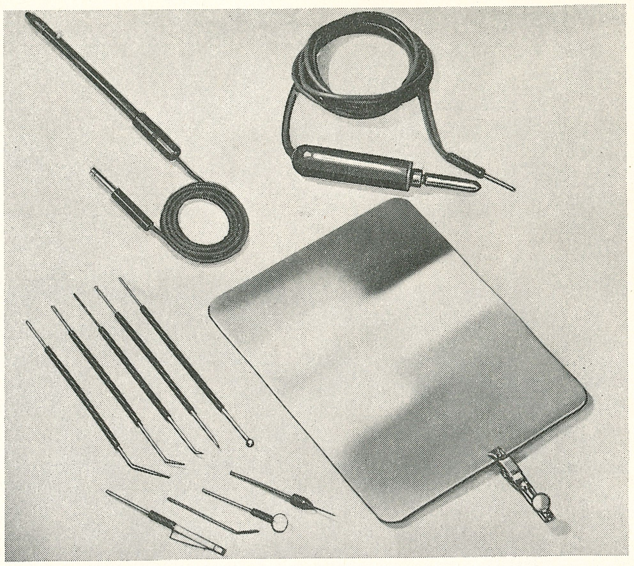
SWS-28	Indifferent Belt Electrode with cord and retaining strap
DA-108	Small Vaginal Electrode
DA-109	Large Vaginal Electrode
DA-110	Prostatic Electrode
DA-114	Thermometer
DAS-115	Cord for active electrode

Technic. Place (SWS-28) Indifferent Belt Electrode around patient at the pelvic level with about 1/2" of Turkish toweling between electrode and patient. Fasten with the rubber strap and connect the cord to either outlet of the unit. Lubricate and insert DA-108 or DA-109 Electrode into vagina with the concave section position under the cervix. If necessary, the electrode may be held in position with sandbags or other means. Connect the electrode to the unit with a DAS-115 Cord. Insert a DA-114 Thermometer into the vaginal electrode as far as it will go and rotate it so that the scale can be read. Adjust power and tuning controls of the diathermy in the usual manner to patient's comfortable tolerance of heat. A maximum temperature of 104° to 106° F. is recommended and if this is attained before end of treatment period (usually 20-60 minutes) reduce the power slightly so as not to exceed the patient's comfortable tolerance.









Electrosurgery with the MF/490 Diathermy

The MF/490 Diathermy provides a very good current for minor electrosurgical work. The active electrode is held in an electrode handle which has a finger-operated switch for turning the current on and off. Various electrodes especially adaptable for desiccation, coagulation, or dissection may be used with this handle. An SWS-2 Condenser Electrode, 7" x 9", may be used as an indifferent electrode or the SU-321 Metal Indifferent Electrode and MFS-11 Indifferent Lead supplied with the MFS-475 Surgical Accessory Set illustrated above may be used if preferred.

Operating Instructions for Electrosurgery

Start with both switches in the off position and with TUNING and OUTPUT controls at 0.

1. Apply an indifferent electrode to the patient. If the SWS-2 Condenser Electrode is used, it should be applied with two or three layers of Turkish toweling between the electrode and the patient. If the SU-321 Electrode is used, it should be applied directly to the skin. The electrode may be placed under the patient's back or at some other location where good maximum contact will be maintained.
   NOTE. For light work it may not be necessary to use the inactive electrode.
2. Attach the indifferent electrode to either cable jack in the unit.
3. Place desired electrode in electrode handle and connect to other cable jack.
4. Turn Timer and POWER switches on.
5. Set TUNING control approximately halfway between 6 and 7. Individual characteristics of some units or some load conditions may require that this control be set at another position for maximum efficiency but ordinarily this setting will produce the desired results.
6. Adjust OUTPUT control as necessary to provide amount of current required for desiccation, coagulation, or dissection with the particular electrode to be used.
   NOTE. Experimentation on a piece of raw beef is suggested as an aid in determining approximate control settings and time factors.
7. Press switch in electrode handle to energize surgical electrode.

PART V

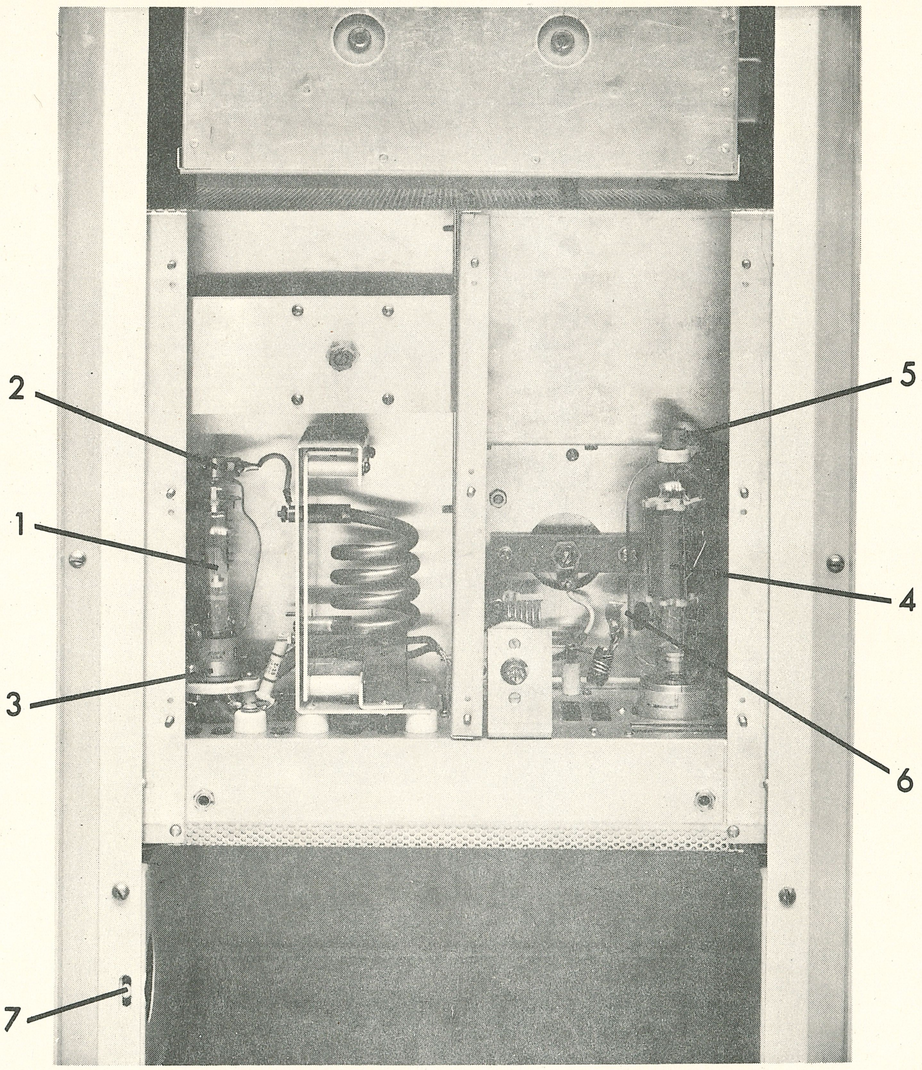
SERVICE SUGGESTIONS

Causes and Correction of Improper Performance of Unit

If at any time the MF/490 Diathermy does not perform properly, the trouble is most likely caused by incorrect TRIMMER adjustment, by inoperable or malfunctioning tubes, or by breaks in the electrical connections in the applicators or electrodes. The first step to eliminate the trouble is to apply the operation check and TRIMMER adjustment procedure described on Pages 7 and 8.

Warning. With the exception of the TRIMMER, locked and/or sealed factory adjustments must not be changed as special test instruments and procedures would be required to effect proper readjustment.

If proper performance is not restored by trimming the unit or if attempts to



The MF/490 Unit with Rear Panel and Cover Plate Removed

1. Type 812-A Oscillator Tube
2. Plate Cap of Type 812-A Tube
3. Retaining Clamp for Type 812-A Tube
4. Type UE-810 Amplifier Tube
5. Plate Cap of Type UE-810 Tube
6. Grid Cap of Type UE-810 Tube
7. Safety Interlock Switch

trim the unit are unsuccessful, new tubes should be tried. A faulty tube can be located by the process of elimination. The tubes used in the MF/490 unit are especially selected and tested for this use and replacements should be obtained from The Burdick Corporation.

To gain access to the tube compartments, remove the rear panel of the unit and the cover plate over the tube compartments. The rear panel is held in place by two screws through the bottom edge of the panel. Remove these screws and pull bottom of panel out and down. The cover plate is attached by nine thumb nuts. When replacing these panels be sure that they are placed properly and that nuts and screws are tightened securely.

If the meter does not indicate at any time when both POWER and Timer switches are turned on, and it is known that the line connections are all right and that the overload relay has been re-set, check the safety interlock switch located at lower right rear side of unit. This switch is actuated by a projection on the rear panel and if the panel is not in proper position, contacts in the switch will not be made and the unit will not operate. A click can be heard when the switch is operated by pushing the panel into proper position.

Failures of electrodes and applicators can be checked by electrical and visual inspection and by substitution of other electrodes and applicators known to be in good operating condition.

Factory Service

The engineering and service specialists of The Burdick Corporation are always ready to be of assistance in those cases which cannot be readily solved. In order that the greatest advantage may be obtained through the factory contact it is important that certain information and material is available to those considering the problem. Therefore, when reporting trouble with this unit, whether it is still in the field or returned to the factory, be sure to send us the following information as completely as possible.

1. A complete description of the symptoms of the trouble. Be sure to state whether the condition is present at all times or is intermittent.
2. A complete account of the steps taken in attempting to eliminate the trouble.
3. The serial number of the unit.

It is usually advantageous to all concerned if repair or trouble elimination is accomplished in the field. However, if it is necessary to return a unit to the factory for repair, it will receive prompt and careful attention. Pack the unit and accessories carefully, preferably in the special cartons designed for their shipment.

MINOR ELECTROSURGERY

The following extracts are taken from an article in the August 1947 issue of THE INTERNE on Electrosurgery by Grant E. Ward, M.D., of Baltimore, one of the pioneers in electrosurgery. These extracts pertain especially to minor electrosurgical procedures although the article covers both major and minor electrosurgery:

> DEFINITION: "Electrosurgery is the application of high frequency currents for the destruction and removal of diseased tissue or for cutting through normal tissue with diminished bleeding." (Kelly and Ward)
>
> The action of these currents on tissue is dependent upon the speed and intensity of the development of heat within them producing three effects: (1) Superficial destruction from dehydration; (2) Deeper destruction by higher temperatures resulting in coagulation; (3) Cutting.
>
> NOMENCLATURE. "Electrodesiccation" is the dehydration of tissue by high frequency electric currents of relatively low temperature without histological loss of cellular characteristics.
>
> "Electrocoagulation" is the deeper destruction of tissue by high frequency currents resulting in total loss of normal architecture. The current is so hot that it actually boils the tissues in their own juices.
>
> "Electrotomy" (a term coined by Gustavus Blech) is, as its name implies, the cutting of tissue with an electric current. Electrotomy may be fine and dehydrating or heavy and coagulating according to the intensity of the current.
>
> INSTRUMENTS. "Active electrode" is of a varying size and shape (needle, small blade, wire loop, ball or disc) held in suitable insulating handle concentrating the current to produce the heat effect mentioned above.
>
> "The inactive electrode" is large and placed at a suitable area on the skin or held in the hand. Its size is sufficient (6" x 8") to disseminate the current over a large area, preventing any destructive effects.
>
> "Electrotome" (Blech) is an instrument used to sever tissue. This may be an ordinary cambric needle held in a suitable handle, a small blade, or a wire loop. The cutting is not done by the instrument but by the current. Wire loops so used are electrotome curettes.
>
> "Desiccator, coagulator." These are small balls, discs or needles. The needles allow local heat effects and the balls and discs, wider areas of destruction.

HISTOLOGICAL CHANGES

"Desiccation." As the name implies, the tissues are dehydrated. The cell walls are visible and the cells shrunken and shriveled. Epithelial cells are still discernible as such. The connective tissue is dried out and blood vessels are shrunken, the smaller ones being destroyed. The architecture of the tumor is not entirely lost.

"Coagulation" produces complete loss of tissue structure, epithelial and connective-tissue cells being converted into a granular homogenous mass. Blood vessels are closed and converted into a homogenous mass with their contained blood. All tissue architecture is destroyed beyond recognition.

"Electrotomy" (cutting). The edge of an electrosurgical incision show, under the microscope, varying degrees of tissue destruction depending upon the strength of the current and the rapidity with which the electrotome is drawn through the tissues. If the current is properly balanced and the electrotome drawn rapidly, there is a minimum of destruction, about 1/10th of a millimeter. The very edge is a thin coagulum beneath which there is slight desiccation. With a more penetrating cutting current and slower passage of the electrotome, more coagulation destruction occurs, up to 1 or 2 millimeters. Such heavy cutting is used in removing tumors from vascular fields, or in prostatic resection through a resectoscope.

SURGICAL TECHNIQUE AND OPERATIONS

"Electrodesiccation." Small benign moles less than 1/2 centimeter in diameter, warts, hyperkeratoses and other blemishes, can be eradicated with a fine needle desiccator. Hyperkeratoses and warts are limited to the epidermis. For treating the former the needle is just applied to the surface; with warts it must be plunged into the base. A small curette removes the dehydrated tissue, the base then being re-treated to prevent recurrence. Moles must first be circumvaleted. The needle is inserted in the normal skin at the edge, remaining until the area whitens. It is then removed to an adjacent area--and so on around the edge of the mole. This accurately marks out the limits of the mole, which then may be destroyed in situ. The needle must be plugged through all layers of the skin, as moles involve dermis and epidermis alike. Only small benign moles should be so treated. After desiccation small warts, moles and blemishes are dressed with 2% gentian violet in 10% acetone and 50% alcohol (Bohlman's gentian violet solution.)

"Electrocoagulation" is used for the destruction of larger tumors.

ANESTHESIA

Small lesions, both benign and malignant, on the skin or in the oral cavity, are readily removed in the office under local anesthesia by desiccation or coagulation.